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ABSTRACT

This project summary reviews and extends the findings of prior reports made by Abt Associates, Inc. (Cambridge, Massachusetts) on the Nutrition Education and Training (NET) program, synthesizes evaluation efforts in nutrition education, and presents a set of conclusions based on the evaluations of nutrition programs. Chapter 1 presents background information on the NET program and gives a brief overview of the report. Chapter 2 describes the organizational framework of most nutrition programs and relates nutrition education activities to their hypothesized effects. Chapter 3 describes how the NET program is intended to work and how it has been implemented and investigates the implementation of programs from 1978 to 1980. Chapter 3 also reviews the legislative mandate behind the national NET program and presents a status report on the program by summarizing findings from surveys of NET state coordinators and a sample of local project directors. Models of three state programs are presented to show the diversity of responses to the program at the state level. Chapter 4 addresses the impact of the NET programs in Georgia and Nebraska, comparing the programs to other nutrition education programs also funded through the NET program or through the Food and Nutrition Service (Department of Agriculture). Conclusions are drawn about the effects of the programs on childrens' nutrition-related knowledge, attitudes, and behaviors. The final chapter sets forth the major conclusions of the report. (FG)

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An Evaluation of the Nutrition Education and Training Program:

PROJECT SUMMARY

Robert G. St.Pierre

May 26, 1981

Prepared for:

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The research reported herein was performed pursuant to Contract No. 53-3198-9-38 with the U. S. Department of Agriculture, Food and Nutrition Service, Office of Policy, Planning and Evaluation. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not necessarily represent official U. S. Department of Agriculture position or policy.

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AN EVALUATION OF THE NUTRITION EDUCATION AND TRAINING PROGRAM

EXECUTIVE SUMMARY

The largest and most recent federal nutrition education effort was approved by the President in November 1977 when the Nutrition Education and Training (NET) program was established with the passage of Public Law 95-166. The NET regulations state that the program is to be implemented through a system of grants to state education agencies to provide for "...(a) the nutritional training of educational and food service personnel; (b) the food service management training of school food service personnel; and (c) the conduct of nutrition education activities in schools and child care institutions."

THE PRESENT STUDY

Because of widespread interest in nutrition education at the federal, state, and local levels, the Office of Policy, Planning and Evaluation within the Food and Nutrition Service (FNS) contracted with Abt Associates Inc. to conduct a study of the NET program. The study reviewed existing nutrition education programs and research activities, described program operations nationally, and assessed program impact in selected States. This is a summary of all the reports produced during the course of this effort.

NUTRITION EDUCATION ACTIVITIES

The first portion of the study provides an account of NET as it operates at the state and local project levels. The following conclusions were drawn:

- This evaluation was conducted when most NET projects were just beginning to be implemented, and NET has made a good start. Programs are operating in most states and NET funds are being distributed and used as intended. Some 86 percent of all NET funding in 1978 and 1979 was spent on grants for almost 3,000 local projects operating in nearly 17,000 schools and reaching more than 3.4 million children. Over 120,000 teachers and 75,000 food service personnel participated in NET-sponsored workshops.

- The great majority of NET State Coordinators and project directors report that they are striving toward the goals intended by the enabling legislation including, for example, increasing children's acceptance of nutritious foods; improving teachers' knowledge of the principles and practices of nutrition education; developing and disseminating curricula and other nutrition education materials; increasing children's knowledge of the relationships among food, nutrition, and health; and increasing the use of the school cafeteria as a learning laboratory for nutrition education.

- A set of diverse state-level NET programs have been developed and implemented. The study identified three models for delivering NET services from the state level: (a) a centralized model under which states provide a uniform set of materials and/or training to multiple local sites; (b) a decentralized model where states provide guidance and resources, but where local projects have the responsibility for deciding exactly what nutrition education activities to implement; and (c) a regional model where services are provided by multiple resource centers, often located with universities. Classroom instruction is included in 85 percent of all projects, and 60 percent use of the cafeteria as a learning laboratory.

- Of course, room for improvement exists. Although most of the objectives of the NET legislation are addressed by the operating programs, there were three areas where, in 1979,* NET activities did not appear to be as fully implemented or as successful as desirable including the training of school food service personnel, the development of integrated programs, and the development of program monitoring and evaluation materials. These topics should be emphasized in the future, perhaps through altered program regulations making expectations in these areas clearer, through the dissemination of information on programs that have been successful in these areas, and through the provision of technical assistance in evaluation.

NUTRITION EDUCATION OUTCOMES

The second part of the study focused on the "outcomes" portion of the organizing framework by conducting evaluations of two "potentially successful" state-level NET programs, and by reviewing the findings from other evaluations of programs funded by NET and other FNS sources. The decision to study potentially successful programs was made in order to see what NET could accomplish under the best of circumstances--to give the program a chance to demonstrate effectiveness under favorable conditions. If no positive program impacts are found under these conditions it is safe to say that the program will not be successful under less favorable circumstances. On the other hand, finding that a program demonstrates success when well-implemented enables policymakers and program practitioners to concentrate on improving the program, on insuring its faithful implementation, or on disseminating the tested successful versions.

The Nebraska Evaluation

The Nebraska NET program was selected for study because it is nationally recognized, was recommended by regional and national FNS staff as well as other nutrition education professionals, and it has a centralized approach to nutrition education that involves the three major target groups of the NET legislation (teachers, food service personnel, and children) in the implementation of a curriculum that is the same in all participating schools. The

*NET projects were in their formative stages when this evaluation was conducted. Project development undertaken since 1979 may well have addressed these problems.

Nebraska program also had some preliminary evidence of effectiveness, is being adopted in seven other states, and the Nebraska State Department of Education was eager to help plan and participate in the evaluation.

Our evaluation of the Nebraska NET program employed a strong research design involving the random assignment of schools to treatment and control group status. Over 2,300 children in grades 1-6 distributed across 20 schools were pretested and posttested with an extensive measurement battery. The conclusions from this evaluation were that:

- A curriculum-oriented centralized nutrition education program can have strong positive impacts on children's nutrition-related knowledge across grades 1-6.
- Positive impacts were also found in grades on 1-3 on reported and behavioral measures of food preference, and in grades 4-6 on behavioral measures of willingness to taste new foods.
- No strong program-related impacts were found on food attitudes, self-reported food habits, or overall plate waste.

The Georgia Evaluation

The Georgia NET program was selected for study because it was recommended as particularly well thought through and implemented, and because Georgia's program follows a "decentralized" model of nutrition education that contrasts with Nebraska's centralized model and that is typical of the NET models implemented in many of the more populous states. The materials used to train program teachers are comprehensive and could be used in other states. Finally, the Georgia State Department of Education was eager to help plan and participate in the evaluation.

Our evaluation of the Georgia NET program employed a relatively weak research design involving the nonrandom selection of treatment schools that were already participating in NET and control schools that were not part of the program. Some 1,400 children in grades 1-8 distributed across seven school districts were pretested and posttested with a limited measurement battery that was designed to detect general impact on nutrition knowledge, attitudes and reported habits rather than changes specific to the Georgia program. Conclusions of the evaluation were that:

- A decentralized nutrition education program can have a positive impact on nutrition knowledge (at least in grades 1-4 and perhaps in grades 5 and 6).
- No strong program-related impacts were found on food attitudes or self-reported food habits.
- The program is more effective with younger (grades 1 and 2) than with older (grades 3-6) children.

Summary of Nutrition Education Evaluations

A review of six other evaluations of nutrition education programs funded by NET and other FNS sources provides evidence corroborating the conclusions drawn from the Nebraska and Georgia evaluations. First, it appears relatively easy to produce positive impacts on nutrition knowledge. All eight studies (Nebraska, Georgia, and six others) report positive findings on knowledge, findings that are not only statistically significant, but meaningful.

Impacts on food attitudes and reported food habits are much more difficult to produce. Four studies reported some positive results on attitudes; however, with the exception of one study these varied by measure and grade. Two studies did find positive impacts on food-related attitudes in grades 1 and 2 suggesting that it may be easier to alter attitudes for children in the early grades. Four of the studies included an examination of self-reported food habits, but none found any strong evidence of program effectiveness in this area.

Evidence on food preference was supplied in only two studies. Conclusions are mixed because one study found a strong indication of positive impacts on reported food preference and willingness to select new foods while the other found no impact.

Findings for willingness to taste new foods and plate waste are mixed. Of the five studies that included some sort of plate waste measurement, only one found a positive impact on total consumption. In the other studies, impacts on consumption varied by grade and food group. One evaluation did find evidence that NET children in grades 4-6 were more willing to taste previously rejected foods than their non-NET peers.

To sum up, this study has shown that a variety of NET and other nutrition education programs can increase children's nutrition-related knowledge. Positive impacts on other outcomes such as food-related attitudes, habits, preferences, and plate waste were also demonstrated, but they tended to vary from evaluation to evaluation and from grade to grade. These findings make a good deal of sense considering the short-term nature of most nutrition education programs. Knowledge is easily conveyed in the short term; to expect a three- or ten-week program to significantly impact behaviors that have been formed for several years is quite different.

ACKNOWLEDGEMENTS

This evaluation represents a cooperative venture involving the Office of Policy, Planning and Evaluation (OPPE) in the Food and Nutrition Service of the U. S. Department of Agriculture, Abt Associates Inc., and many members of the Nutrition Education and Training program community. OPPE staff including Drs. Victor Rezmovic and Jack Radzikowski provided overall guidance to all phases of the project.

We wish to express thanks to the writers who contributed to our review of nutrition education programs and research. These persons include Dr. Judy Brun, Dr. Isobel Contento, Dr. Ann Hertzler, Ms. Martha Mapes, Ms. Joanne Nestor, Ms. Martha Plass, Ms. Jill Randell, and Dr. Allene Vaden.

Sincere appreciation is also extended to the NET State Coordinators and Local Project Directors who were all very prompt and cooperative in responding to our surveys.

The Nebraska State Department of Education sponsored the development of the Experience Nutrition curriculum, approved a preliminary evaluation plan submitted by Abt Associates, and cooperated in all phases of our Nebraska evaluation. We extend special thanks to several people in Nebraska including Ms. Glenda Uhrmacher of the Swanson Center for Nutrition (former NET Program Coordinator for the Nebraska State Department of Education); Dr. William Majure of experience education; Dr. Ray Steinert, Director of the Child Nutrition Programs Section for the Nebraska State Department of Education; Ms. Jaime Ruud, NET Program Coordinator for the Nebraska State Department of Education; and the principals, teachers, food service personnel, and children from Nebraska schools who participated in the evaluation.

The Georgia State Department of Education cooperated in every way possible. Special thanks are extended to Ms. Ann Register (Georgia NET

Coordinator) and Ms. Andrea Sattinger (of the Georgia NET staff) who enthusiastically represented and gained support for the evaluation from district administrators, school administrators, teachers, and food service managers, and who arranged for the collection of the Georgia evaluation data. We also wish to express appreciation to the district-level administrators who contributed to implementation of the evaluation and to the principals, teachers, food service personnel, and children from Georgia schools that participated in the evaluation.

Abt Associates' role as the prime evaluation contractor focused on coordinating the literature review, developing the evaluation and survey designs, selecting and developing measures, collecting and analyzing the data, and preparing this report. Special thanks are due to Dr. Thomas Ferb who was Project Director during the first year of the evaluation; Ms. Judith Glotzer who was Deputy Project Director and who contributed to all aspects of the study, especially the literature review and the impact evaluations; Ms. Joanne Nestor who co-edited the literature review and the surveys of NET State Coordinators and Local Project Administrators; Mr. David Napior who had a major role in the design, implementation, and analysis of the NET surveys; Ms. Jane Hentzler who was Abt Associates' data collection coordinator in Nebraska; Dr. Elizabeth Comstock who provided expert assistance in many phases of the food consumption study; Ms. Zhenya Mackiernan, Ms. Cheryl Vernon, and Mr. Peter Glass who assisted in the data collection and processing; and Ms. Claudia Kelly and Ms. Ann Czajkowski who provided administrative and secretarial support.

Assistance in many phases of the study, especially the design, analysis, and reporting related to the Nebraska evaluation, was provided by Cook and Cook, Inc. Dr. Thomas Cook and Mr. Roger Straw each contributed to these efforts.

CHAPTER 1

INTRODUCTION

The largest and most recent federal nutrition education effort was approved by the President in November 1977 when the Nutrition Education and Training (NET) program was established with the passage of Public Law 95-166. Because of widespread interest in nutrition education at the federal, state, and local levels, the Office of Policy, Planning and Evaluation (OPPE) within the Food and Nutrition Service (FNS) contracted with Abt Associates Inc. (AAI) to conduct a study of the NET program. To satisfy primarily the needs of the nutrition education community, and to provide background and context for subsequent activities, the study included a review of existing nutrition education programs and research activities. To satisfy primarily the information needs of senior FNS staff and program managers, the evaluation was structured to provide a description of program operations nationally. To satisfy primarily the interests of Congress, the Office of Management and Budget, federal oversight agencies, and advocacy groups, the study included an assessment of program impact in selected states having projects implemented sufficiently to manifest effects on students within the time frame of the evaluation. Finally, to meet the needs of all the above groups, the study called for the preparation of a project summary that integrated findings from the prior reports. The reports prepared in these areas under this contract are as follows:

SUBJECT	REPORT
• Literature Review	Glotzer, J., and Nestor, J. (Eds.). Nutrition Education: A Review of the Literature, 1980.
• Program Description	Ferb, T., Glotzer, J., Nestor, J., and Napior, D. The Nutrition Education and Training Program: A Status Report, 1977-1980.

• Evaluation	St.Pierre, R., Glotzer, J., Cook, T., and Straw, R. An Evaluation of Nebraska's Experience Nutrition Curriculum.
	St.Pierre, R., and Glotzer, J. An Evaluation of the Georgia Nutrition Education and Training Program.
	St.Pierre, R. Summary of Measures from the Nebraska and Georgia Nutrition Education and Training Program Evaluations.
• Project Summary	St.Pierre, R. An Evaluation of the Nutrition Education and Training Program: Project Summary.

This project summary reviews and extends the findings of the prior reports, synthesizes evaluation efforts in nutrition education, and presents a set of conclusions. Chapter 2 presents an organizing framework relating nutrition education activities to hypothesized impacts. Chapter 3 describes how NET is intended to work and how it has been implemented. Thus, it investigates how NET programs operating between 1978-80 addressed the "activities" portion of our nutrition education framework. It reviews the legislative mandate behind the national NET program and presents a status report on the program by summarizing the findings from a national descriptive study of NET state plans and needs assessments, and the results from surveys of NET State Coordinators and local project directors. Finally, it includes descriptions of three types of state-level NET programs. Chapter 4 addresses the "impacts" portion of the nutrition education framework by summarizing the results of several NET evaluations and comparing them with findings from evaluations of other nutrition education programs. Finally, Chapter 5 sets forth the major conclusions of the evaluation.

CHAPTER 2

AN ORGANIZING FRAMEWORK FOR NUTRITION EDUCATION ACTIVITIES AND IMPACTS

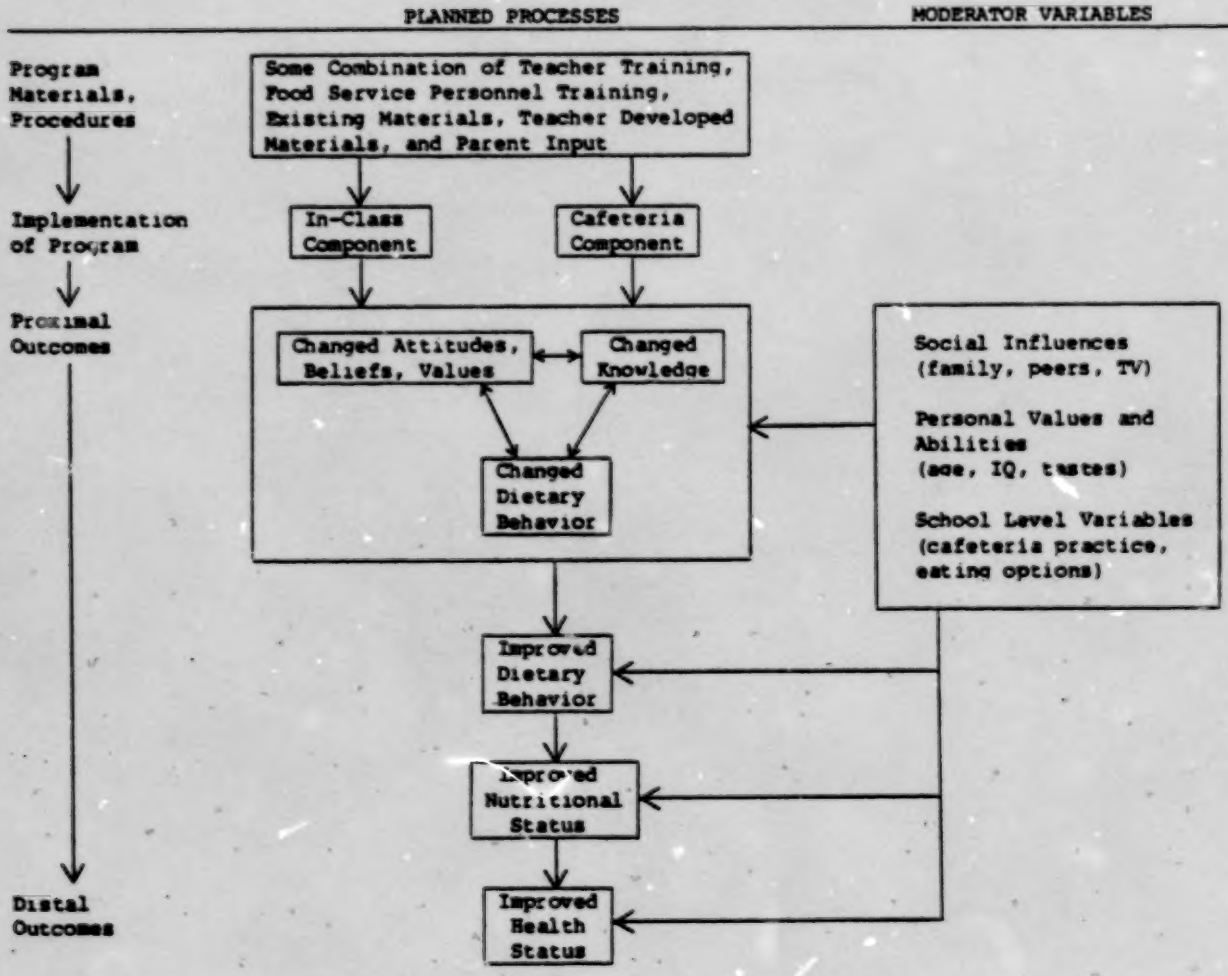
NUTRITION EDUCATION EVALUATION: AN ORGANIZING FRAMEWORK OF ACTIVITIES AND HYPOTHESIZED IMPACTS

Most nutrition education programs aim to change children's* nutrition-related knowledge, attitudes, and behaviors with the long-range goal of improving nutritional and health status. To help set the stage for the description and evaluations of NET in Chapters 3 and 4, an organizing framework of the causal change hoped for in nutrition education programs is given in Figure 1. The framework is in general agreement with others in the field (e.g., Nestor and Glotzer 1981) and with those focused specifically on the NET program (e.g., Gillespie 1979). It shows that a nutrition education program is often composed of a combination of products and processes including, for example, training of teachers and food service personnel, use of existing materials and other resources, development of new materials by classroom teachers, and parent participation. The program almost always includes an in-class component, and often may involve the cafeteria. Implementation of the program in the classroom and cafeteria is hypothesized to impact on children's nutrition-related attitudes, beliefs, values, knowledge, and dietary habits/behavior. Although the developers of different programs hypothesize different relationships within this group of variables, the causal connections are unclear, as shown in the framework. Changes in attitudes, knowledge, and behavior, once they occur, are presumed to lead to improved dietary behavior, then to improved nutritional status, and finally to improved health status.

*Nutrition education programs typically identify children as the primary target group. Although other constituencies include teachers and school food service personnel who interface with children directly and/or modify their previous practices in preparing and displaying food, the intent is that involvement of teachers, food service personnel, parents, or any other group be for the ultimate benefit of children.

Figure 1

Organizing Framework of Nutrition Program Activities and Outcomes


PLANNED PROCESSES
MODERATOR VARIABLES
Program Materials, Procedures
Implementation of Program
Proximal Outcomes
Distal Outcomes
Some Combination of Teacher Training, Food Service Personnel Training, Existing Materials, Teacher Developed Materials, and Parent Input
In-Class Component
Cafeteria Component
Changed Attitudes, Beliefs, Values
Changed Knowledge
Changed Dietary Behavior
Social Influences (family, peers, TV)
Personal Values and Abilities (age, IQ, tastes)
School Level Variables (cafeteria practice, eating options)
Improved Dietary Behavior
Improved Nutritional Status
Improved Health Status

Nutrition Education Theories

The chain of events shown in Figure 1 is such that changes in early or "proximal" outcomes (e.g., delivery and receipt of the classroom curriculum packages) will lead to changes in later or "distal" outcomes (e.g., improved health status). In the absence of a well-articulated theory of how nutrition education works, at least two views of the causal links among the outcomes identified above appear reasonable. A highly cognitive theory of the causal relationship between education and health status postulates that children first need to learn new information that is designed to affect their health; then this information has to affect their beliefs and feelings about specific nutrition-related behaviors; this new predisposition then has to affect the nutritional behaviors in question. Of these behaviors some--but not all--will improve nutritional status. Most educational programs are designed according to such a cognitive theory of personal change and have the immediate goal of affecting knowledge, the more remote goal of changing feelings, the even more remote goal of changing behavior, and the yet more remote goal of improving nutritional status.

A second view of the causal relationships shown in Figure 1 could be termed "social environmental." Many nutrition education programs attempt to influence the child's environment in some combination of the following principal ways: (a) by training food service personnel who change the type of food provided in school cafeterias or the way food is served; (b) by having food service personnel and teachers cooperate to achieve nutritional ends; and (c) by developing an outreach component designed to influence parents. The social environmental view posits that the consumption behavior of children may change because there are new choices in the school cafeteria, rather than because of what has been learned in class. While changes in the environment or in

behaviors are not expected to impact on knowledge directly, such changes should make the classroom more conducive to learning about nutrition.

Irrespective of whether the favored causal theory is cognitive or social environmental, the set of concepts that the evaluator should measure is basically the same. Yet, the fact that nutrition education is grounded in an ambiguous theory of learning limits the ability of any evaluation to account for instructional effects.

Moderator Variables

The foregoing framework would be unrealistic if it did not take cognizance of a host of influences termed "moderator variables" that codetermine process and outcome variables. Such influences affect the sign and magnitude of any causal impact, and in Figure 1 we highlight three such classes of influences. The first set of moderator variables might loosely be called "social influences variables." These include family, peers, the media, and culture, all of which are presumed to have a powerful effect on knowledge, beliefs, attitudes, and behaviors about nutrition. It is, after all, usually parents who decide the menu of a family, despite the advice and firm urgings of their offspring as to what should be bought and laid on the table. Any program designed to influence feeding habits inside or outside of the family setting must realize that parental disapproval of the program's message--whether overt, covert, or inadvertent--will mediate impact.

The second class of moderator variables relates to the attributes and values of the child, whether these have their origin in the family or not. Some children may not have the ability at a certain age to decode a nutritional message or to see its relevance to life; others may see the relevance of eating a certain way but just not like the diet preferred by experts. All of these factors can codetermine the success of a program.

A third set of moderator variables concerns school variables of relevance to nutritional practices. Variables in this category include the availability and price of snack foods in the cafeteria and elsewhere; the number of children eating school lunches and the percentage who receive free or partially paid lunches, teachers' support for feeding programs and their belief in the value of good nutrition and nutrition education; the physical design of the cafeteria; the number of shifts in which eating takes place; the amount of time set aside for eating during each shift; whether the eating is done by classes, grades, or some other system; the amount of choice offered in the food provided; and whether the food is cooked on the premises.

In spite of the fact that our organizing framework hypothesizes that moderator variables play a critical role in determining the effects of a nutrition education program, most programs give little or no recognition of their relationship to the student's overall nutrition environment. Further, nutrition education research has rarely assessed the effects of moderator variables on nutrition-related knowledge, attitudes, and behaviors.

FOCUS OF NUTRITION EDUCATION PROGRAMS AND IMPLICATIONS FOR EVALUATION

The nature of most nutrition education programs suggests support of the widely held belief that because the United States food supply is more than adequate and because most families are able to obtain an adequate diet, the determining factor in dietary adequacy is the appropriateness of the choices made in selecting foods. Yet, most nutrition education programs have the dual

goals (a) of imparting nutrition knowledge so that program participants can make "informed" eating choices about the foods they eat, and (b) developing "desirable" eating behaviors. Program developers place differential emphasis on these goals, some believing that nutrition education should provide information in order that people can make informed dietary choices and that nutrition programs should not interject values about eating habits because that would be invading the domain of personal decision making. Others believe that the provision of information is not adequate to change dietary behavior (witness the number of overweight nutritionists, or in the health field, the number of doctors who smoke), and that the best way to develop desirable eating behaviors is to encourage them explicitly.

In spite of this focus on informed choice and desirable eating behaviors, there is no agreed-upon body of nutrition knowledge addressed by nutrition education programs; nor is there agreement on the key elements of such knowledge. Perhaps even more distressing is that there is little agreement about desired behaviors. According to Guthrie (1978) "...we should not cling to any method of [nutrition] education unless we have evidence that it brings about desirable habits in food consumption" (p. 58). Yet, Contento (1980) recognizes the lack of agreement on desired behaviors in pointing out that:

> ...if nutrition education programs and curricula are going to be increasingly evaluated on the basis of their effects on the behavior of children, it must be assumed that it is because we believe that there are indeed some behaviors which are more desirable than others. Nutrition education cannot avoid, therefore, specifying what these are . . . (p. V-74).

The lack of agreement on desirable nutrition behaviors, attitudes, and knowledge is a major factor contributing to the lack of a strong theory linking these variables. Further, the construction of valid and reliable

measurement instruments is a most difficult task when there is ongoing disagreement about exactly what the instruments should be measuring. Only recently have a few "standardized" tests of nutrition knowledge appeared on the market (e.g., the Nutrition Achievement Test by the National Dairy Council; the Nutrition Education Assessment Series by Planning, Development and Evaluation Associates). Even these tests do not have well established measurement properties.

CHAPTER 3

THE STATUS OF NET

This chapter focuses on NET's approach to the nutrition education activities and inputs shown in the model presented in the previous chapter. It first describes the national NET program, and then reviews findings from a nationally descriptive summary of NET programs' state plans and needs assessments as well as from the results of recent surveys of all NET State Coordinators and a national sample of 475 local project directors (Ferb et al. 1980). It provides an account of NET as it operates at the state and local project levels by describing NET target population needs, program goals, resource allocation, service delivery mechanisms, and program outcomes and obstacles. Finally, it contains brief descriptions of selected NET state-level programs.

THE NATIONAL NET PROGRAM

Legislative Background of the National NET Program

The Nutrition Education and Training Program (NET) was established in 1977 via an amendment to the 1966 Child Nutrition Act. The purpose of NET as stated in the enabling legislation (Public Law 95-166) is "...to encourage effective dissemination of scientifically valid information to children participating or eligible to participate in school lunch and related child nutrition programs." Such programs are understood to mean multidisciplinary programs "...by which scientifically valid information about foods and nutrients is imparted in a manner that individuals receiving such information will understand the principles of nutrition and seek to maximize their well-being through food consumption practices."

Prior to 1977, FNS addressed these needs by funding pilot projects under the National School Lunch Act and the Child Nutrition Act. These pilot projects included seminars, workshops, grants for nutrition education involving schools and communities, and for the training of school food service personnel.* A fundamental difference between NET and previous federal nutrition education efforts is the way that grants were organized and administered. Instead of one-time grants for specific state-level projects that reached relatively few children, the NET legislation mandated "...a system of grants to State Education Agencies for the development of comprehensive nutrition information and education programs."

The national NET program is administered by the Program Administration Section of the Nutrition Education Branch within the Nutrition and Technical Services Division of FNS, with the cooperation of seven regional FNS offices. Interim regulations governing the NET program's administration were issued shortly after the legislative mandate. In May 1979 final regulations were published (Federal Register, Vol. 44, No. 95). The regulations begin by stating that the nutrition information and education effort would be carried out by a system of grants to state education agencies to provide for "...(a) the nutritional training of educational and food service personnel; (b) the food service management training of school food service personnel; and (c) the conduct of nutrition education activities in schools and child care institutions" (p. 28282). Participating states are required to establish advisory councils in order to insure that the advice and recommendations of interested teachers, food service personnel, food and nutrition professionals and paraprofessionals, administrators, consumer groups, parents, and other individuals

*A publication by the USDA Nutrition and Technical Services Division (1979a) covers projects funded during the period 1970-77.

concerned with child nutrition are considered in program planning, implementation, and evaluation.

Finally, the regulations specify that projects are to be administered by state education agencies. Each state was allocated an amount equal to $.50 (now $.29) per child enrolled in schools and institutions, but not less than $75,000 to cover program and administrative costs during each fiscal year. The total entitlement amounted to approximately $25 million per fiscal year in 1977-78 and 1978-79, $20 million for fiscal year 1979-80, and $15 million for 1980-81. A proportion of the total grant was made available to each state during the first year of participation in order to employ a State Coordinator who was to conduct a needs assessment and develop a state plan. Once the plan was approved the remaining funds were to be released.

Activities and Objectives of the National NET Program

The target groups for the national NET program and the activities focused at each group are summarized below (USDA 1979b):

Target Group	Activity
Children (early childhood programs and grades K-12)	To conduct pilot demonstration projects which may include, but are not limited to, development, demonstration, testing, and evaluation of curricula and classroom materials to instruct "students with regard to the nutritional value of food and the relationship between food, nutrition, and health.
Food service personnel/cafeteria personnel	To develop and conduct training programs in the principles, skills, and practices of food service management and in the relationship between food, nutrition, and health.
Teachers/early childhood, elementary and secondary educational personnel	To develop and conduct training programs with respect to providing nutrition education programs; with respect to the relationship between food, nutrition, and health; and with respect to educational methods and techniques, and issues relating to nutrition education.

Although NET has several target groups, children are the ultimate target of the program. The training of other groups is the educational means designed to impact upon students' attitudes, knowledge, and behavior regarding nutrition and health. NET is intended to create opportunities for children to learn about the importance and application of the principles of good nutrition in their daily lives. Better understanding of these principles and their relationship to health is expected to increase the probability of acceptance of the nutritious foods provided through food service operations.

STATE ORGANIZATION AND OPERATIONS

NET regulations require states to assess the nutrition education and training needs of students, teachers, and food service personnel. In addition, states are required to prepare annual state plans which establish priorities for each target group, identify resources, set NET goals and objectives, describe strategies for implementing the program and evaluating the attainment of objectives, indicate milestones, establish a state advisory council, and assure compliance with federal requirements for civil rights, financial management, and program monitoring. Funds are made available to states to have a NET State Coordinator who is responsible for the needs assessment and development of the state plan.

Ferb et al. (1980) prepared a status report on the NET program which covered the period 1977-80 and which was based on a review of state plans and needs assessments as well as a survey of State Coordinators and local project directors. At the time the survey was conducted (December 1979) FNS had approved state plans from 44 states, the District of Columbia, the Virgin

Islands, and American Samoa. All but one of the six states that chose not to participate in the program are minimum grant states; however, no consistent reason was given for why these states chose to remain outside the program at that time. Survey data were analyzed for all 47 states/territories which had approved plans. The following sections summarize findings from Ferb et al. (1980).

State-Level Needs Assessments

The NET program was designed so that states would have the flexibility to determine their own needs and to implement programs to meet those needs. To this end, NET regulations call for a needs assessment to be conducted on an ongoing basis so that states can determine their nutrition education and training needs in 15 categories for each year. Needs assessment information should then be used to formulate annual state plans. Using various sources of information and surveys of NET's target groups, State Coordinators found that:

- nutrition education materials and curricula for teachers were not available widely (reported in 46 states);
- substantial numbers of teachers lacked training and opportunity for training in nutrition education (45 states);
- substantial numbers of school food service personnel lacked important management and meal production skills and opportunity for training in such skills (42 states);
- the coordination of teachers and school food service personnel was hindered by problems of communication and administrative support (36 states) and by the fact that food service staff and facilities were not recognized as a nutrition education resource (18 states);
- students had poor dietary intake (42 states), many had health problems including obesity (35 states) and high incidence of dental decay (27 states);
- the food intake of students was adversely affected by income constraints (20 states), television (9 states), and parent attitudes and misinformation (11 states); and

- skipping meals (20 states), high rates of plate waste in the school lunch program (12 states), and poor participation in the school lunch program (15 states) contributed to the poor diet of students.

The widespread nature of the identified needs confirmed the factors which contributed to the original passage of the NET legislation. Of particular interest was the high incidence of reported health problems. These same concerns were reported in the "Ten State Nutrition Survey" (Department of Health, Education and Welfare 1972) nearly a decade ago.

The needs assessment process was considered to be useful by most State Coordinators. However, many noted that time and resource constraints made it difficult to conduct full needs assessments annually. Though an annual needs assessment was not a legal requirement, misinterpretations of the nature and purpose of the needs assessment were common and were the source of many informal grievances with the needs assessment process.

State-Level Resource Allocation

Data on state-level planned expenditures for fiscal years 1978 and 1979 were collected via a survey of NET State Coordinators. Estimated combined expenditures for these two fiscal years total over $46 million. The estimated expenditures per state range from $16,000 to over $4 million. Of the total funds approximately five percent were used to pay the salaries of NET State Coordinators and associated administrative costs, one percent for travel and equipment, two percent for supplies and rentals, and six percent for evaluation and needs assessment. The majority of NET funds (86 percent) were spent on grants for local projects.

This apportionment, in general, indicates that NET funds are being used as intended. All programs where 60 percent or less of the total project funds were allocated to projects were in smaller states with total statewide

funding of $200,000 or less over two years. In these states, disproportionate amounts of money were allocated to administrative costs, although the actual dollars spent were relatively few. These programs, like the larger programs, incurred heavy start-up costs; however, financial and anecdotal reports show that small states simply cannot afford to meet state and federal administrative demands and still have funds left for local projects.

In addition to financial resources provided by USDA, State Coordinators had access to institutional and personnel resources for nutrition education and training. These non-financial resources included consultation primarily with state advisory councils, colleges and universities, and other offices within the state education agency.

State Program Goals

State Coordinators were asked to indicate the extent to which their programs addressed a series of 14 goals. Responses indicated that the majority of State Coordinators are striving toward the goals intended by the enabling legislation. The highest priority goals indicated by State Coordinators were:

- to change children's food values and attitudes in order to increase their acceptance of nutritious foods (45 states);
- to improve teachers' and administrators' knowledge of the principles and practices of nutrition education (45 states);
- to develop, promote, disseminate, and/or evaluate curricula and other types of educational materials for nutrition education (44 states);
- to increase children's knowledge of the relationships among food, nutrition, and health (43 states); and
- to increase the use of the school cafeteria as a learning laboratory for nutritional education (42 states).

Coordinators' responses also indicated that NET funds are not being used to duplicate the efforts of other similar programs and that NET has introduced basic nutrition education in many areas where virtually none existed before.

A key area where state programs may be falling short of NET objectives is in the development of "integrated" approaches to nutrition education.* Fourteen states have indicated that, at the present time, the development of "integrated" approaches to nutrition education and teams involving teachers, food service personnel, and administrators is not a major goal. The need for active and integrated involvement of teachers and food service personnel in nutrition education was recognized in the NET legislation and regulations. The fact that this goal is not being addressed by a number of state NET programs reflects a continuing need for curricula and materials with such a multidisciplinary focus.

Obstacles to State Program Implementation

Three obstacles to program success were reported by over half of the State Coordinators: establishing systems of monitoring, feedback, and evaluation for state and local programs; getting results that others will believe are evidence of program success; and "red tape" and forms required by state agencies, and by FNS regional and national offices.

The State Coordinators' concerns about "red tape" and forms are to be expected. Any program must include a degree of administrative burden which conflicts with the delivery of services. However, the State Coordinators have had a substantial reporting burden during the first years of NET, being required to conduct needs assessments and prepare three state plans in a

*An integrated approach is one which involves students, teachers, food service personnel, and school administrators, and which combines in-class lessons with experiential cafeteria-based activities.

period of roughly 18 months. This reporting burden has no doubt contributed to the State Coordinators' concerns.

Documenting progress and the effectiveness of services is difficult to demonstrate without effective monitoring and evaluation. State Coordinators are handicapped by the lack of training and methodologies in the field of nutrition education. They also have difficulty in identifying useful and relevant evaluation tools, in obtaining data and identifying target population needs, and in developing needed materials.

LOCAL PROJECT ORGANIZATION AND OPERATION

An estimated 2,956 local projects have been funded through state NET programs during 1977-1980. These projects have involved a variety of types of organizations and activities with different goals and participants:

- 35 percent of the projects were located in local schools;
- 37 percent of projects were based in school districts;
- 10 percent of the projects were sponsored by child care institutions;
- 7 percent were sponsored by colleges and universities; and
- the remaining projects were housed by regional educational organizations, private non-profit organizations, and state agencies other than the State Education Agency.

Although schools, school districts, and child care institutions account for more than 80 percent of the projects, they have received just over 50 percent of the total funds. By contrast, colleges and universities account for just seven percent of the projects and have received 26 percent of available funds. The distribution of funds reflects the NET program's objectives not only to provide nutrition education to students but also to train teachers and food service personnel and to develop materials and curricula.

Local Project Goals

The various organizational hosts have prioritized their project goals and implemented activities that are responsive to the NET legislative mandate. Most NET projects, irrespective of the host organization, place priority on the same student-level goals rated highly by State Coordinators. In addition, colleges and universities place high priority on a series of goals related to the needs of food service personnel and teachers. These include:

- increasing food service personnel's participation in the nutrition education process (81 percent of colleges and universities);
- increasing food service personnel's knowledge and application of nutrition principles and nutrition education (80 percent); and
- improving food service personnel skills in meal planning and preparation (73 percent).

NET goals concerned with the development of an integrated educational approach through nutrition education teams and increased use of the school food service facility as a learning laboratory for nutrition education were given high priority in only slightly more than half of the projects. It is clear that as a standard mode for nutrition education, the integrated approach is currently weak because critical elements of this approach are being addressed by operating NET programs only moderately.

Participants in Local Projects

The NET legislation specifies that the program shall be designed to meet the needs of teachers, food service personnel, and students at all grade levels. The highlights of participation by these various groups are:

- More than 3.4 million students or seven percent of the student population have been reached by NET projects. More than three million elementary children and 100,000 junior high and high school students in nearly 17,000 schools have received classroom instruction in nutrition education.

- Over 11,000 schools have participated in projects that use the cafeteria as a learning laboratory, involving over 2.5 million students; and nearly one million students have participated in nutrition-related activities outside the classrooms or cafeteria.

- 120,000 teachers or four percent of the nation's teachers participated in NET-sponsored workshops and 75,000 food service personnel (15 percent of the nation's total) participated in workshops sponsored by NET.

Local Project Activities

Funds for local projects were spent on materials development, teacher and food service personnel training, instruction for children, regional nutrition centers, and other grants and contracts that involved the delivery of nutrition education and training. By far, the most extensive activities among projects are those serving students.

- Classroom instruction of students is included in 85 percent of all projects. Sixty percent of the projects have used the cafeteria as a learning laboratory, and 51 percent have included some other student-oriented activity, such as nutrition fairs or gardening projects.

- Schools and school districts provide the greatest number of activities aimed at students, accounting for 82 percent of such activities.

- Colleges and universities provide the least number of projects with only a third including student-oriented activities and accounting for only two percent of the projects that provide student instruction.

NET projects have designed activities targeted toward students with special nutrition education needs or special educational needs. Among these students are pregnant teens, obese children, and mentally retarded students. Also included among children with special needs are minority students who may have language difficulties or whose food choices and eating patterns may be influenced by culture or ethnicity.

- Nineteen percent of all projects have conducted activities reaching a total of more than 30,000 obese students.

- Nine percent of the projects sponsored programs for more than 11,000 pregnant teens.

- Special nutrition education activities for mentally retarded students have been conducted in 23 percent of all projects, reaching over 18,000 of these students.

- Thirty percent of all projects have included activities for more than 104,000 minority students.

Workshops for teachers and food service personnel are intended to provide training in the principles of child nutrition and nutrition education, procedures for the use of the cafeteria as a learning laboratory, methods of classroom instruction for teachers, and methods of improved food service for cafeteria staff.

- Sixty-six percent of the projects provided workshops for teachers; 5,000 workshops were held for a total of 120,000 teachers. The average workshop involved teachers who received, on the average, more than 16 hours of instruction.

- Forty-six percent of the projects offered workshops for food service personnel, including a total of 75,000 food service staff who received an average of more than 11 hours of instruction.

- Local schools and school districts sponsored teacher training in roughly two-thirds of their projects, but only a little over a third of school and school district projects offered training for school food service personnel.

- Colleges and universities offered teacher training in only half of their projects, but 80 percent of these included training for food service personnel.

Materials were provided for future use in virtually all workshops for teachers and food service personnel. These workshops focused on topics that are broad in scope and relate to primary NET objectives. A relatively small percentage (59 percent) of teacher workshops included training in use of the cafeteria as a learning laboratory, suggesting that much of the material distributed does not include guidance for integration of classroom and cafeteria-based nutrition education.

Obstacles to Local Project Success

Among all projects, the obstacles perceived as most problematic are "red tape" and forms required by state agencies (rated as problematic or extremely problematic by 36 percent of all project administrators) and "red tape" and forms required by the FNS regional or national office (32 percent). The next most difficult obstacles relate to requirements to set up monitoring, evaluation, and feedback systems and to obtain project results that provide evidence of progress, both rated as problematic or extremely problematic by 34 percent of the project administrators. These difficulties mirror those noted at the state level.

STATE-LEVEL NET MODELS

As described above, the national NET program provides a system of grants to states in part for the development of educational materials and curricula. There is no particular model of nutrition education advocated by the NET program for use on a national basis. Instead, state education agencies have the responsibility for developing state-level programs.

In the present study we distinguish between three types of models for delivering NET services from the state level: (a) a centralized model under which states provide a uniform set of materials and/or training to multiple local sites; (b) a decentralized model where states provide guidance, training, resources, and a framework for nutrition education, but where local projects have the responsibility for deciding exactly which nutrition education activities to implement; and (c) a regional model where nutrition information and training is provided to local projects by multiple resource centers, often located within universities. To illustrate these three models we give brief descriptions of the state-level NET models implemented in Nebraska,

Georgia, and New York. Many other state programs could have been included, and the selection of these only indicates that they are representative of others in a group.

The Nebraska NET Program

The Nebraska NET program is centrally-administered with all participating school districts implementing the same curriculum, known as "Experience Nutrition," which consists of 11 prepared packages of instruction for grades K-6. Each package consists of several separate activities, and "steps" for the implementation of each activity are specified. In addition, there is specific provision for delivery of the packages to students--each package includes 12 to 20 class hours of activity/instruction and, to varying degrees, all involve food service personnel, teachers, and students in one or several activities within packages.

The program integrates nutrition concepts with basic curricula such as health, social studies, language arts, math, science, art, and music through activities such as comparing food costs, writing and acting out skits, tasting a wide variety of foods, following recipes, planning menus, and conducting scientific experiments. Food service personnel are involved in each package, and two packages are designed to be presented to students by food service personnel. Although use of all 11 packages provides systematic and comprehensive coverage of basic nutrition principles, each package stands on its own and includes its own subject presentation. Packages include all the software and most other items (over 1,800 pieces in all) required for conducting the activities. This "hands-on" curriculum includes all materials needed for a class of 30 students, and materials may be used year after year.

The Georgia NET Program

Georgia's NET program is representative of many other states participating in NET in that its model of nutrition education is decentralized. The State Department of Education considers individual school systems, schools within systems, teachers, and food service personnel in those schools as the key initiators and implementors of nutrition education. The state's role is to facilitate and support initiation and implementation efforts by providing the conceptual framework for nutrition education, goals and objectives, extensive training, resource materials, evaluation, and follow-up.

The Georgia program is voluntary in the sense that school systems are not required to avail themselves of training opportunities. However, school systems apply for grants on a competitive basis, and once awarded a grant, they are obligated to participate in a five-day nutrition education training workshop and a two-day follow-up. Further, teachers are expected to return to their schools and teach nutrition education in their regular classes as well as train other teachers to teach nutrition education. Thus, each teacher is considered to be both an individual agent of change through teaching students and a "multiplier" as a result of training other teachers.

Subsequent to training, personnel within school systems are responsible for planning, organizing, and implementing nutrition education projects that meet state goals and objectives in ways that are most feasible and effective in the particular system. In this way, the Georgia model allows nutrition education projects to be tailored to the particular administrative needs of the school or school system and to the needs of the student population. The state firmly believes that for NET to be successful in Georgia, nutrition education efforts must be designed locally and supported by administrators, educators, parents, and the community. In this context, the state

has attempted to allow as much flexibility as needed while at the same time providing guidance, technical assistance, and a framework for nutrition education that is constant across all participating schools.

The New York NET Program

New York's NET program is administered through a series of 17 regional nutrition coordinators located throughout the state. They (1) assess the nutrition education and training needs of children, food service personnel, and teachers in their area, develop instructional and resource materials, and then implement programs to meet those needs; (2) work with local and regional advisory committees to enhance nutrition education and food service programs in schools and other eligible agencies; and (3) provide technical assistance and resources to help schools develop in-service education programs for teachers and food service personnel.

The coordinators also instruct teachers in use of a nutrition curriculum for grades K-9 and the companion teacher's manual. Finally, the coordinators plan and implement in-service education programs for food service personnel in nutrition knowledge and food service management and encourage using the cafeteria as an environment for learning about food and nutrition.

New York NET program funds have been used for a variety of other activities including the training of regional coordinators; development and evaluation of a pre-K learning package in English and Spanish, and a K-6 resource kit to supplement the state Nutrition Curriculum Guide; development of public service announcements; completion of ten 30-minute television programs and a companion teaching guide; and incorporation of nutrition education information into a state-run system that disseminates education-related information and research.

Summary of NET Models

These brief summaries show that the national NET program has sponsored a range of nutrition programs including some that use a structured, curriculum-centered approach developed and administered at the state level, others that use a decentralized approach in which states provide guidance and resources, but school systems and individual teachers are responsible for developing their own programs, and still others that employ a regional model.

Special attention is drawn to this diversity in models because the evaluations conducted as part of this study and a review of other nutrition education evaluations suggests strongly that the different models can each produce positive effects, at least on tests of nutrition-related knowledge.

CHAPTER 4

RESULTS OF NET AND OTHER NUTRITION EDUCATION EVALUATIONS

The preceding chapters introduced the NET program, described an organizing framework relating nutrition education activities to hypothesized impacts, provided an account of NET as it operates at the state and local levels, and described some state-level NET programs. Given this broad background the present chapter focuses on the "outcomes" portion of the framework discussed in Chapter 2 by summarizing the results from evaluations of the Nebraska and Georgia NET programs performed as part of the present project, and reviewing the results from evaluations of other nutrition education programs funded by NET or other FNS sources, in order to draw conclusions about the effects of nutrition education programs on children's nutrition-related knowledge, attitudes, and behaviors.

EVALUATION OF THE NEBRASKA NET PROGRAM (ST. PIERRE, GLOTZER, COOK, AND STRAW 1981)

The Abt Associates Inc. evaluation of NET in Nebraska involved studying a potentially successful model of nutrition education, in order to see what NET can accomplish under the best of circumstances. The decision to limit our evaluation to potentially successful models was intended to maximize the chances of detecting positive effects and minimize the chances of "washing out" positive effects by averaging them with negative ones. The point is to enable the program to demonstrate effectiveness under favorable conditions. If no positive effects are found under these conditions it is safe to say that the program will not be successful under less favorable circumstances. On the other hand, finding that a program demonstrates success when well-implemented

enables policymakers and program practitioners to concentrate on improving the program, on insuring its faithful implementation, or on disseminating the tested successful versions.

The Nebraska NET program was selected for study because it is nationally recognized, was recommended by regional and national FNS staff as well as other nutrition education professionals, and it has an approach to nutrition education that involves the three major target groups of the NET legislation: teachers, food service personnel, and children. It also had some preliminary evidence of effectiveness, is being adopted in seven other states, and the Nebraska State Department of Education was eager to help plan and participate in the evaluation. Although Nebaska's NET program operations are funded by FNS, the curricular portion of Nebraska's NET program was developed through joint efforts of the Nebraska State Department of Education, experience education, and the Swanson Center for Nutrition, Inc.

Description of the Nebraska Evaluation

The evaluation assessed the Nebraska NET program in terms of how well it was implemented and the impact it had upon children's knowledge of nutrition, upon their attitudes and preferences in the nutrition domain, and upon their reported and observed behavioral nutrition habits. The major questions addressed in this evaluation were: (1) To what extent has the Nebraska NET program been implemented in the participating schools? (2) What are the short-term consequences of the Nebraska NET program as it influences nutrition-related knowledge, attitudes, preferences, and habits? (3) What are the likely long-term consequences of the Nebraska NET program?

To achieve these aims, data were collected from over 2,300 children in 96 classrooms distributed across grades 1-6 in 20 schools spanning the

state of Nebraska. The 20 participating schools were randomly selected from 98 applicants for NET and were randomly assigned to treatment (13 schools) or control (seven schools) status with the understanding that control schools would be guaranteed participation in NET the following year. In most sampled schools all classes participated in the evaluation; however, in some instances classes were selected only at particular grade levels. All children in any selected class were included in the evaluation.

The evaluation began in mid-year and a battery of measures was given to children on three occasions: the full battery was administered to the full sample as a pretest in February 1980 and again as a posttest in May 1980; a subsample of NET and non-NET children were followed up in December 1980 with a subset of the measurement battery. Thus, the pre/post time period was ten weeks and the pre/follow-up time period was ten months. Mail questionnaires were sent to teachers and food service managers in May and December 1980 for the purpose of estimating the degree to which they implemented the curriculum.

Because the pre/post data collection had to be completed in spring 1980, the evaluation was limited to an assessment of the effects of three curriculum packages in grades 1-3 and three others in grades 4-6. Teachers were asked to "concentrate" delivery of these packages into the ten-week pre/post time span. Therefore, we conducted two parallel studies, and evaluated a subset of the Experience Nutrition curriculum packages (six out of 11) in a cross-sectional rather than a longitudinal fashion.

The measurement battery was developed by constructing some new instruments, using some that had been developed in Nebraska specifically for the purpose of evaluating the Experience Nutrition curriculum, and using "standardized" measures of nutrition knowledge. Because of time pressures the

measurement battery was developed quickly without vigorous pilot-testing. We therefore subjected the pretest data to a thorough psychometric analysis in order to delete poor items and construct reliable scales to use as outcomes measures. This process produced measures representing each content domain at each grade level.

In addition to paper and pencil measures of nutrition-related knowledge and attitudes, the evaluation included two assessments of food-related behavior. In grades 1-3 children were surveyed to determine the frequency with which they ate each of several fruits and vegetables. Based on this information a decision-making situation was set up in which children were given a choice in the school lunch line between familiar and unfamiliar fruits and between familiar and unfamiliar vegetables. The Nebraska program developers hypothesized that NET children would be willing to experiment with new foods and would select the unfamiliar fruits and vegetables more often than non-NET children.

A second behavioral assessment, amount of waste of each food item in the school lunch, was made in grades 1-6. Because of the expense and logistical difficulties involved, plate waste data were collected according to a quasi-experimental design which involved subsampling three NET and two non-NET schools. Two measures of waste were examined: (1) total waste and waste by food group as percentages of average serving sizes, and (2) the proportion of children who ate none of a given food at pretest but who at least tasted that food at posttest. In this area the Nebraska program developers noted that while overall waste reduction was not a goal of their program, NET children should be more willing to try previously rejected foods than their non-NET peers.

Summary of Results

A summary of the evaluation results is presented here including findings about (1) program implementation, (2) program impact on measures of nutrition-related knowledge, attitudes, preferences, and behaviors, and (3) the results of a follow-up study.

The Program Was Implemented

Teachers and food service personnel did, in fact, implement the Experience Nutrition curriculum packages. The Experience Nutrition program developers do not specify any particular sequence or timing for implementation, preferring that teachers use the curriculum packages to fit their needs. In order to accommodate the evaluation, delivery of the packages had to be "concentrated" into a ten-week span. In spite of this, the average classroom teacher implemented close to 80 percent of the scheduled class-level activities, and the average school food service director implemented close to 60 percent of the scheduled school-level activities. Comments supplied by classroom teachers suggest that they may well have, without our knowledge, implemented portions of the school-level packages that were intended to be taught by food service personnel, and so the estimates of school-level implementation are likely to be lower bounds on the real values. Since the curriculum allows teachers flexibility to pick and choose portions to implement, the amount of activities covered in the ten-week span allowed a fair test of the treatment.

Students Liked the Program; Teachers Felt the Program Achieved its Goals

Teachers and food service personnel rated the Experience Nutrition curriculum packages in terms of student reactions and the degree to which the packages achieved their goals. On the whole, there was a strong feeling that students reacted positively to the curriculum packages and that the packages were achieving their objectives.

These findings lead to the conclusion that an assessment of program impact can proceed with confidence that the treatment was implemented. Further, it appears that the Experience Nutrition materials can be used and used well by teachers and food service personnel with a minimum of training. Teachers report that students like the curriculum and that the curriculum does well at achieving most of its objectives.

The Program Required a Substantial Effort; Involvement of Food Service Personnel Was Mixed

The above findings do not mean that there were no problems in implementation or that all teachers and food service personnel found implementation to be easy. Many teachers complained that the amount of time required for implementation was far in excess of what the Experience Nutrition materials recommended, and in excess of the time they could devote. Moreover, the integration of efforts by teachers and school food service personnel that is envisioned by the Experience Nutrition program developers is not accomplished easily. Other examples of problems with implementation are that levels of implementation for the packages to be delivered by food service personnel were lower than for packages to be delivered by teachers, teachers may have replaced food service personnel as instructors in some cases, and some food service personnel commented that they were not involved as much as they wished. These difficulties all speak to the issue that involvement of teachers, food service personnel, and children in a comprehensive nutrition education program is easier said than done.

Impact of the Program

The Experience Nutrition curriculum had positive effects on children in some areas and no effects in others. Table 1 presents a summary of results by content domain and grade level. Table 2 presents results at a more disaggregated level. In this discussion we speak of the program as having a "positive effect" when treatment group children gained significantly more from pretest to posttest than control group children.

Table 1

Summary of Results by Content Domain and Grade Level

Content Domain	Grades 1-3	Grades 4-6
Nutrition Knowledge		
(Curriculum-Specific)	Positive Effects	Positive Effects
(General Knowledge)	No Effects	Positive Effects
Food Attitude	No Effects	No Effects
Food Preference		
(Reported Preference)	Positive Effects	Mixed Effects
(Willingness to Select New Foods)	Positive Effects	N.A.
Food Habits		
(Reported Habits)	No Effects	No Effects
(Willingness to Taste New Foods)	No Effects	Positive Effects
(Plate Waste)	No Effects	No Effects

Effects on Knowledge Were Positive and Consistent

The strongest and most positive finding is that of positive treatment effects on nutrition knowledge. These effects are compelling as they hold across grades and across different measures of knowledge. Further, they are stable when either children or classrooms are used as the unit of analysis. The positive knowledge effects are clearest in grades 4-6 where statistically significant effects are exhibited on all seven different knowledge measures (e.g., recognition of nutrients, knowledge of the digestive system, relation of energy to calories, knowledge of what food supplies). Perhaps most impressive is the fact that the knowledge gains produced on six of the measures which were developed specifically to assess the effects of the Experience Nutrition curriculum in grades 4-6 are replicated by substantial gains on a "standardized" test (the Nutrition Education Assessment Series) which was developed to measure a broader spectrum of nutrition knowledge. Clearly, "teaching the test" is easier than producing knowledge gains which transfer to a more general, but still heavily overlapping, measure of knowledge.

In grades 1-3, positive effects on nutrition knowledge exist but are not quite as clear as those in grades 4-6. The major difference is that

Table 2

Summary of Results from the Nebraska Evaluation
by Content Domain, Measure and Grade Level

Grades 1-3

Content Domain	Measure*	Results** Across Grades	Results By Grade 1	2	3
Nutrition Knowledge	Knowledge of Breakfast Foods	+	+	0	+
	Knowledge of Foods that Grow Underground	+	+	+	0
	Nutrition Knowledge (Dairy Council)	0	NA	NA	0
Food Attitude	Food Attitudes	0	0	0	0
Food Preference	Vegetable Preference	+	0	+	+
	Willingness to Select New Fruits	+	NA	NA	NA
	Willingness to Select New Vegetables	+	NA	NA	NA
Food Habits	"Good" Consumption Habits	0	0	0	0
	"Bad" Consumption Habits	0	0	0	0
	Willingness to Taste New Foods	0	NA	NA	NA
	Plate Waste	0	NA	NA	NA

Grades 4-6

Content Domain	Measure*	Results** Across Grades	Results By Grade 4	5	6
Nutrition Knowledge	Great School Menus	+	+	+	+
	Relation of Energy to Calories	+	+	+	+
	Energy Balance Knowledge	+	+	+	0
	Digestive System Knowledge	+	+	0	0
	What Nutrients Does Food Supply?	+	+	+	+
	Recognition of Nutrients	+	+	0	+
	Nutrition Knowledge (NEAS)	+	+	+	+
Food Attitude	Food Consumption Attitudes	0	0	0	+
	School Lunch Attitudes	0	0	0	0
	Breakfast Foods Attitudes	0	+	0	-
Food Preference	Fruit Preference	+	+	+	0
	Vegetable Preference	0	0	0	0
Food Habits	School Lunch Habits	0	0	0	0
	"Good" Consumption Habits (AAI)	0	0	0	0
	"Bad" Consumption Habits (AAI)	0	0	0	0
	Active Habits	0	0	0	0
	Inactive Habits	0	0	0	0
	"Good" Consumption Habits (NEAS)	0	0	0	0
	"Bad" Consumption Habits (NEAS)	0	0	0	0
	Willingness to Taste New Foods	+	NA	NA	NA
	Plate Waste	0	NA	NA	NA

* These measures were derived via a psychometric analysis of several curriculum-specific and off-the-shelf nutrition education tests.

** + signifies a statistically significant effect favoring the treatment group.
- signifies a statistically significant effect favoring the control group.
0 signifies a null or non-significant effect
NA signifies that a grade level estimate could not be made

in grades 1-3 positive knowledge effects are found on curriculum-specific measures (e.g., knowledge of breakfast foods, knowledge of foods that grow underground), but not on the more general measure of nutrition knowledge derived from the Dairy Council Nutrition Achievement Test which was not targeted to the Nebraska curriculum.

In addition to the finding of statistically significant effects on nutrition knowledge, it is important to note that the effects are large in an absolute sense. The adjusted treatment/control group differences on the nine knowledge measures which exhibit significant effects range from .23 to .82 standard deviations.* Thus, the effects on knowledge are statistically significant and meaningful. There is also evidence that for many knowledge measures a higher level of implementation is associated with larger effects. That is, children who were taught more, learned more.

All these results point to the conclusion that the Experience Nutrition curriculum significantly increased the knowledge of participating children. The consistency of the results across measures, grades, and units of analysis; the fact that the effects are large in absolute magnitude; the positive relationship on many scales between implementation and size of effect; and the fact that effects are larger and more consistent in grades 4-6 than in grades 1-3 when, in fact, the curriculum in grades 4-6 is primarily knowledge oriented, make for an impressive and compelling finding.

Control Children Also Exhibited Knowledge Gains

Although positive effects of the Nebraska NET program were found on measures of nutrition knowledge (treatment children gained significantly more

*Where possible we will augment statements about statistical significance with information as to the "practical" significance or the "meaningfulness" of an effect. The measure we use for this purpose is the standard deviation unit, and we interpret effects of .25 standard deviations or more as being meaningful. This is a standard that has gained some acceptance in judging the size of educational effects.

than control children), control group children also showed gains on every knowledge measure. This raises the policy question of whether the "competing treatment" experienced by the control children (defined as whatever they experience through their regular school program--the competing treatments include "Food...Your Choice" and perhaps other nutrition education programs) may be sufficient for some purposes. Put another way, the control group children are learning something about nutrition--not as much as the treatment children, but something. Since the Experience Nutrition curriculum places an additional cost on participating schools, the question of cost effectiveness arises. This evaluation does not have information to address this question adequately, but it is raised because control students do, in fact, exhibit some gains in the absence of the Experience Nutrition curriculum.

No Effects Were Found on Food Attitudes

The curriculum did not significantly alter attitudes about food in any consistent manner. In grades 1-3 no significant effects were found in any grade. For grades 4-6 some positive effects were found with respect to attitudes toward food consumption and attitudes toward breakfast; however, these were inconsistent and varied by grade.

Positive Effects Were Found on Food Preferences in Grades 1-3; Mixed Effects Were Found in Grades 4-6

There is strong evidence of positive effects on food preference in grades 1-3. First, the Experience Nutrition curriculum influenced children's self-reported preference for vegetables. As was the case for knowledge, the findings are enhanced by the fact that classrooms where the curriculum package dealing with vegetables was best implemented showed more pronounced changes in reported preferences.

Second, and more important, positive effects were noted in grades 1-3 on a behavioral measure--increased willingness to select unfamiliar vegetables. That is, when given a choice in the school lunch line between an unfamiliar and a familiar vegetable, NET children were more likely to select the unfamiliar one than their non-NET counterparts. The evidence for effects on preference for fruits is not so consistent, but what there is suggests that the program may well have led children to select unfamiliar fruits when offered a choice in their school lunch.

In grades 4-6 the effects on food preferences are mixed. No effects are evident with respect to self-reported preference for vegetables, and the positive results for fruits are inconsistent across grades and are not replicated when clases are used as the unit of analysis. Behavioral data on food selection were not collected in grades 4-6.

No Effects Were Found on Reported Food Habits

There simply were no effects on reported food habits either in grades 1-3 or 4-6. Measures of "good" and "bad" consumption habits, school lunch habits, and active and inactive habits all showed no effect. If the program did, in fact, have an impact on reported food habits we are fairly sure it would have been detected by at least one of these measures.

Positive Effects Were Found on Children's Willingness to Taste New Foods in Grades 4-6 but Not in Grades 1-3; No Effects Were Found on Plate Waste

Data on changes in eating patterns gathered via measurement of plate waste support the hypothesis that the Nebraska NET program had an impact on children's willingness to sample previously untasted foods. That is, after participation in the program NET children were more willing to taste foods that they didn't eat before the program than were non-NET children. However, when the data are broken down by grade it is apparent that the entire treat-

ment effect occurs in grades 4-6; there are no NET/non-NET differences in grades 1-3. This is contrary to what we might expect since the Nebraska curriculum emphasizes experimenting with foods in grades 1-3 and knowledge gains in grades 4-6.

The data on amount of food consumed indicate that no treatment-related changes occurred either across or within food groups. There are some pre/post changes in consumption for individual foods within individual schools, but these changes are inconsistent and weak. It is reasonable to conclude that the Nebraska NET program had no effect on the amount of food consumed by participating children during the school lunch period. This does not preclude the possibility of changes occurring in the home or in other food-related situations.

Because this part of the evaluation used a quasi-experimental design, findings regarding food consumption (positive effects in terms of encouraging NET children to sample previously rejected foods and no effects on total consumption) cannot be given the same weight as the other findings on nutrition knowledge, attitudes, preferences, and reported food habits. Even so, it should be recognized that the results conform to the pattern of effects hoped for by the Nebraska program developers who state (a) that their program encourages experimentation with different foods and teaches children to be willing to taste unfamiliar food items, but (b) that they place no value on the amount of food consumed. We have seen that the effects are at variance with expectations in one respect, because children in grades 1-3 show no change in terms of willingness to taste previously rejected foods while children in grades 4-6 show substantial change, and speculate that this pattern of effects may be reflective of a need for the provision of nutrition knowledge before behavior change can be expected.

Knowledge Effects Persisted but Effects in Other Domains Were Not Evident in a Follow-Up Study

In order to investigate whether the positive effects on nutrition knowledge and food preference reported above are enhanced, sustained, or whether they decay over time, and in order to see whether effects on food attitudes and reported food habits can be detected over a longer period of time, follow-up data were collected almost a year after pretesting. As promised, treatment and control classrooms were given the option of using Experience Nutrition materials during the period between posttesting (May 1980) and follow-up testing (December 1980). Very few classrooms did so; however, many teachers reported plans to use the curriculum packages in the spring.

The follow-up data reveal that positive knowledge effects were maintained in all grades, although effects were not quite as strong at the follow-up as at the posttest. The positive effects on food preferences that were seen in grades 1-3 were not detected at the follow-up, leading us to conclude that these effects decayed when the program was withdrawn. Finally, there was no evidence of "delayed" or "sleeper" effects for food attitudes or reported food habits--no effects were found in these domains either in the main evaluation or in the follow-up.

Conclusions about the Nebraska Evaluation

In the face of these positive findings about NET in Nebraska, two issues need to be considered: (1) the degree to which we believe that the Nebraska program rather than some other influence was responsible for the results, and (2) the degree to which the results of this study say something about the effectiveness of the Experience Nutrition curriculum outside of Nebraska and the effectiveness of the national NET program.

We are quite confident that the treatment, rather than some extraneous factor, caused the effects reported here. An examination of plausible rival hypotheses (e.g. unreliability of measures, treatment diffusion, competing treatments, differential attrition) described in the main evaluation report uncovered little to dispel this notion. Further, consideration of whether this evaluation might have overestimated or underestimated the true treatment effects leads us to conclude that our findings may well represent lower bounds. It is possible that children exposed to more of the Experience Nutrition packages, over a longer time span, and measured with improved instrumentation, would exhibit larger gains than those shown in this study.

Three other studies yield additional information on the effects of the Nebraska NET program and allow us to broaden our perspective. First, Majure (1980) reported results from a quasi-experimental evaluation of Nebraska's Experience Nutrition materials in eight states and metropolitan areas. Findings of this study indicated significant positive treatment effects on several measures including breakfast variety, breakfast tradition, key nutrients, food safety, food advertising, and physical fitness.

In a second related study, the Swanson Center for Nutrition (1979) reported the results of a field test of the Experience Nutrition materials in three Nebraska school districts. The data from many measures show pre/post-test gains, and the report concludes that the program had positive effects on children's behavior (selection of foods not previously eaten) and nutrition-related knowledge. No effects were found on attitudes. It is difficult to know whether this interpretation is valid, since the study did not employ a comparison group.

Finally, Crosby and Grossbart (1980) mailed questionnaires to the parents of children who participated in St.Pierre et al.'s (1981) evaluation of the Experience Nutrition program. Parents reported positive program

effects such as NET children being more likely than their non-NET counterparts to know about nutrition and about different foods, to ask for meal items and snacks learned about in school, and to believe that a balanced diet is important. Parents also reported considerable parent/child interaction over the program. The study is flawed by a rather low 44 percent response rate which could well have biased the results in favor of NET.

To sum up, these three studies find generally positive effects of the Experience Nutrition curriculum. Though the methodological flaws of the studies would render them unconvincing if taken alone, they corroborate the findings and increase our confidence in the present evaluation.

This evaluation should therefore be regarded as showing that NET can work; that a well-developed, centrally administered, curriculum-oriented nutrition education program can have positive effects on children's knowledge and behaviors. However, it cannot tell us whether the Experience Nutrition curriculum will work as well in other locations, nor can it tell us about the success of other NET models.

EVALUATION OF THE GEORGIA NET PROGRAM (ST. PIERRE AND GLOTZER 1981)

A second evaluation conducted as part of the Abt Associates Inc. NET study assessed the impact of the Georgia NET program. As was the case in the Nebraska evaluation, Georgia had a reputedly exemplary program. Selected for study because it was recommended as particularly well thought through and implemented, Georgia's program provides an important contrast with Nebraska's in that it follows a "decentralized" model of nutrition education typical of that in many of the more populous states. The materials used to train program teachers were comprehensive and could be used in other states. Finally, the Georgia State Department of Education was eager to help plan and participate in the evaluation.

Because of problems in implementing the evaluation design, conclusions reached about the effectiveness of the Georgia NET program will be tentative. This study may underestimate the effects of the Georgia program, and the information contained here should be used as background and input to future evaluations of the Georgia program rather than as providing conclusive evidence on program effectiveness.

Description of the Evaluation

The evaluation focused on an assessment of the Georgia NET program in terms of the results it had upon children's knowledge of nutrition, upon their attitudes in the nutrition domain, and upon their reported nutrition habits. Further, the evaluation assessed the degree to which the measurement battery was relevant to the nutrition education activities taught in participating classrooms. To achieve these aims within the restrictions posed by Georgia's existing commitments to school districts already participating in NET, a quasi-experimental evaluation was designed, and data were collected from a purposively selected sample of over 1,400 children in 52 classrooms distributed across grades 1-8 in seven school systems spanning the state of Georgia. Over 700 children whose teachers participated in the NET training program formed the treatment group while more than 600 children who had teachers who did not take part in the NET training sessions served as the comparison group.

The sample was drawn purposively in several stages, relying on the recommendations of the NET State Coordinator, in order to maximize the representation of "exemplary" school systems, schools, and classrooms. In spite of everyone's best efforts some school systems, schools, and classes dropped out or declined to participate and thus the final sample is characterized by a degree of self-selection.

The program was scheduled to run for the 1979-80 school year. Teacher training was conducted during the summer of 1979, and program operations were scheduled to begin at the start of the school year. However, this evaluation contract was not awarded until June 1979, and AAI, FNS, and Georgia did not agree on the inclusion of Georgia as an exemplary state for evaluation until October 1979. At that point no appropriate measurement battery existed and a battery of child-level instruments was developed and administered as a "pretest" in early December 1979. A somewhat reduced battery was administered as a posttest in early May 1980. A mail questionnaire was sent to all participating teachers and food service managers in May 1980 for the purpose of documenting teacher background, to assess the overlap between the test items and the program as implemented, and to obtain information on the amount of nutrition education activities covered prior to the pretest.

Summary of Results

A summary of the evaluation results is presented here including findings about (1) program implementation, and (2) program impact on measures of nutrition-related knowledge, attitudes, and reported habits.

A Variety of Nutrition Education Activities were Conducted

During the 1979-80 school year site visits were conducted by the Georgia State Department of Education for the purpose of observing and documenting NET activities in classrooms. Reports from these visits do not offer a systematic description of NET as implemented in Georgia, but they do show clearly the variety of nutrition education activities that were implemented in participating classrooms and reflect the operation of the decentralized model.

While most schools were in some way involved with activities to promote nutritious eating habits, the activities varied and often served multiple purposes. In one school the food service prepared and served a "country breakfast" to students and parents. In addition to promoting a nutritious breakfast, this served to involve parents in nutrition education. In many

classrooms nutrition education was integrated with arithmetic by planning lessons around food costs and food budgeting. Many lesson plans were designed to teach students to read and evaluate food labels and to learn about advertising techniques that may be misleading. Audiovisual materials were used extensively and in one school students wrote and produced their own nutrition "spots."

As reported, the most successful nutrition education projects were those that involved school administrators and parents who helped with ideas and organization. Less successful projects were reported in schools with little or no administrative support or where there was misunderstanding about who was ultimately responsible for nutrition education curricula. In these schools where there was no clear direction or director, nutrition projects simply had difficulty getting off the ground.

The array of activities, which vary in type as well as quality, show that where Georgia NET project administrators are motivated, the program process operates well--students, school personnel, and parents describe nutrition education experiences with enthusiasm. Where a variety of factors may impede motivation to implement nutrition education, the process works less well. It is difficult then to make conclusive remarks about the "workability" of the Georgia decentralized model. In some systems, there seems to be a need for more structure and guidance from a central base. Other systems seem to thrive on their freedom to be creative.

It is clear from reviewing the field reports of the State Department of Education that the Georgia NET program can be characterized accurately as "decentralized." Teachers, schools, and school systems do work within the broad goals set by the state, yet their programs are diverse and self-generated.

The Test Battery was Relevant to the Program Content

School systems, schools, and individual teachers participating in the Georgia NET program have a great deal of freedom in determining the content and pacing of NET at the classroom level. Given this planned diversity it was impossible ahead of time to ascertain the degree to which the evaluation's measurement battery would be relevant to classroom activities. Information supplied by teachers on the relevance of the test battery lets us proceed in the belief that the great majority of items in the test battery (over 90 percent) are indeed relevant to the nutrition education activities occurring in NET classrooms. Information supplied by non-NET teachers suggests strongly that nutrition education of some sort is taking place in many comparison classrooms (78 percent of the test battery was relevant to what comparison teachers were teaching) and that our evaluation of the Georgia NET program involves a comparison of alternative nutrition education treatments.

Nutrition Education Took Place Prior to the Pretest

Many NET teachers reported covering significant amounts of nutrition material prior to the pretest--material relevant to 44 percent of the items in the test battery. Further, most non-NET teachers reported that the test battery was relevant to their classroom activities and it appears that the "treatment" offered the comparison children in Georgia was almost as appropriate to the test battery as the treatment offered NET children. Therefore, this evaluation is constrained in its ability to detect effects of the program--analyses may well underestimate the "true" treatment effects. If positive (or negative) effects are found they will have been produced under a handicap, but we will have some confidence that they exist. On the other hand, the interpretation of a finding of "no effects" will be much more

difficult. It will be unclear whether no effects were found because the program was ineffective or because the effect was "missed" due to the weak evaluation design. This is not a reflection on the program, but on the weakness of the evaluation as implemented.

Impact of the Program

In spite of the difficulties noted above, the Georgia NET program had positive effects on children in some areas and mixed effects in others. Table 3 presents a summary of results by content domain and grade level. Table 4 shows results at a less aggregated level.

Table 3

Summary of Results by Content Domain and Grade Level

Content Domain	Grades 1-3	Grades 4-6	Grades 7, 8
Nutrition Knowledge	Positive Effects	Mixed Positive and Null Effects	Mixed Null and Negative Effects
Food Attitudes	Mixed Positive and Negative Effects	Mixed Positive and Null Effects	NA
Food Habits	Mixed Positive, Null, and Negative Effects	Mixed Null and Negative Effects	NA

Effects on Nutrition Knowledge Were Large and Positive in the Early Grades but Declined in the Later Grades

The pattern of effects in the knowledge domain is characterized by gains in NET and non-NET groups on most measures. Even though comparison children exhibited gains, they were outscored by NET children in the early grades and the evaluation found large positive effects in grades 1-4, marginally positive or null effects in the middle grades (5 and 6), and null or

Table 4

Summary of Results from the Georgia Evaluation
by Content Domain, Measure, and Grade Level

CONTENT DOMAIN	MEASURE	GRADE 1	2	3	4	5	6	7	8
Nutrition Knowledge	Nutrition Knowledge (Dairy Council 1)	+	+						
	Nutrition Knowledge (Dairy Council 2)			+	●				
	Nutrition Knowledge (Dairy Council 3)					O	O		
	Nutrition Knowledge (NEAS/Intermediate)				+	O	O		
	Nutrition Knowledge (NEAS/Intermediate)*				+	●	●		
	Nutrition Knowledge (NEAS/Jr. High)							-	O
Food Attitudes	Food Attitudes (AAI)*	+	+	-					
	Food Consumption Attitudes (AAI)*				O	●	O		
	School Lunch Attitudes (AAI)*				O	O	O		
	Breakfast Attitudes (AAI)*				+	●	O		
Food Habits	"Good" Consumption Habits (AAI)*	O	O	-					
	"Bad" Consumption Habits (AAI)*	+	+	O					
	School Lunch Habits (AAI)*				-	O	O		
	"Good" Consumption Habits (AAI)*				-	O	O		
	"Bad" Consumption Habits (AAI)*				-	O	O		
	"Good" Consumption Habits (NEAS)*				O	O	O		
	"Bad" Consumption Habits (NEAS)*				O	O	O		

* based on scales developed in the Nebraska study
\+ signifies a statistically significant effect ($p<.05$) favoring the treatment group
● signifies a statistically significant effect ($p<.10$) favoring the treatment group
O signifies a null or non-significant effect
\- signifies a statistically significant effect ($p<.05$) favoring the control group

negative effects in junior high. Strong positive treatment effects are observed in grades 1-4 on two different "standardized" tests of general nutrition knowledge (the Dairy Council Achievement test and the Nutrition Education Assessment Series). In addition, the effects in these grades are large, ranging from .25 to 1.27 standard deviations, or about 1-5 test items. In grades 5 and 6 no significant knowledge effects were observed, although some indication of positive differences exists as measured by a version of the NEAS which contained a reduced number of items. In grade 7 we see a significant negative effect on the NEAS measure that is caused because the positive gain in the NET group is smaller than the positive gain of the non-NET control children. No positive or negative knowledge effects are evident in grade 8.

Effects on Food Attitudes Vary by Grade and Measure

In the attitude domain we see a mixed pattern of positive, negative, and null effects which vary by grade and measure. Large positive effects are found in grades 1 and 2 on a measure of food attitudes, and the negative effect in grade 3 reflects outstanding performance by the comparison children rather than a decline in attitudes of NET children. Scattered positive or marginally positive effects are noted in grades 4 and 5, and no effects are evident in grade 6.

Effects on Reported Food Habits Vary by Grade and Measure

For the food habits domain we again see a mix of positive, negative, and null effects which, except for the large positive effects on one scale in grades 1 and 2, are characterized by rather small effect sizes.

Conclusions about the Georgia Evaluation

The results of this evaluation are in line with those of many other evaluations of in-school nutrition education programs. We find generally positive effects on nutrition knowledge (at least in grades 1-4 and perhaps in grades 5 and 6) and mixed effects on food attitudes and food habits. The Georgia program appears to be more effective with younger than older children, since positive effects are observed in grades 1 and 2 on measures in all three domains.

These findings should be tempered by some caveats. First, as noted earlier, this study is quasi-experimental and the potential nonequivalence of NET and non-NET groups may bias the results. Second, the data presented earlier in this chapter suggest strongly that much nutrition education activity had already occurred in NET classrooms prior to the pretest, with the potential for attenuating any observed effects of the program. Third, in many cases the non-NET group gained from pre to posttest, and comparison children may have been participating in nutrition education through sources other than NET. Data supplied by non-NET teachers support this hypothesis since they indicated that much of the test battery was relevant to activities that they would be conducting in their classes. Finally, the measurement battery was weak psychometrically, with many scales having low reliability. Therefore, positive effects may be understated.

In addition to these caveats, the decentralized nature of the Georgia program is crucial to the interpretation of the evaluation results. Georgia NET staff hold standardized training sessions for staff in all participating schools; however, once the training is complete, school staff are responsible for building their own programs based on input received at the training, on existing resources and materials, and on any materials they might devise.

Thus, it is quite likely that the NET programs implemented in the schools participating in the Georgia evaluation were quite different from one another. The absence of in-depth documentation of those school-level programs limits our ability to attribute program effects. The best evaluation for a state using a decentralized model would allow an analysis of program effects on a school-by-school basis. In this way the evaluation would be able to distinguish between differentially effective school-level programs. The most that can be said in the present case is that, in the early grades, the Georgia program demonstrates general effectiveness on measures of nutrition knowledge across a variety of schools which may well be implementing different nutrition education activities.

Some corroborating evidence for the findings of this evaluation is available from two sources. A study by Emory University (1980) found pre/post knowledge gains for children in Georgia's NET program. While unable to stand on its own merits because of methodological problems, the Emory study does support the gains reported in the present evaluation. A study by Thielke, Boyce, and Martinson (1981) claims that posttest differences favoring treatment over control children in terms of total caloric intake and nutrient consumption are due to participation of their teachers in the Georgia NET program training session. Because of the weakness of this study (no pretest, nonequivalent groups) and the lack of corroborating data from the present evaluation, we are hesitant to agree with its conclusions.

Though it is surprising that positive effects have been found given the weakness of the evaluation as implemented (late pretest, existence of competing treatments, and unreliable measures), the finding of positive knowledge effects reinforces the conclusions of other evaluations: nutrition education programs seem to be able to convey knowledge consistently. The

mixed effects on measures of food attitudes and food habits also agree with findings from other studies: nutrition education programs have not been able to consistently affect these measures.

FINDINGS FROM OTHER NUTRITION EDUCATION EVALUATIONS

The findings from our evaluations of NET in Nebraska and Georgia are important, and their value is enhanced by placing them in the larger context provided by other related evaluations. Our criteria for selecting evaluations to review in this section were that they be as strong as possible in terms of research design and measurement characteristics. Thus, the discussion draws upon evaluations of nutrition education programs in California, Pennsylvania, and West Virginia, as well as a study conducted across five states.

Evaluation of the California NET Curriculum Guide (Wolff 1980)

Wolff (1980) conducted an evaluation of the California curriculum guide for nutrition education in preschool through grade 6. The study involved non-randomly formed treatment and comparison groups in 12 school districts and six preschools. Over 5,500 children were pre and posttested in Fall 1979 and in Spring 1980 with a measurement battery developed to assess knowledge, attitudes, and behavior (plate waste).

Across all grades treatment children gained significantly more than comparison children in terms of nutrition knowledge. Significant treatment effects were found within each of the grades 1-6 but not in preschool or kindergarten. In addition to being statistically significant the gains also appear to be reasonably large in magnitude. Although precise information on the variability of scores was not contained in the report, the overall treatment effect corresponds to a gain of about one item or .25 standard devia-

tions. The within-grade effects ranged from no items in preschool to about two items in grade 6, the latter being about .5 standard deviations.

The evaluation also found a positive treatment effect on attitudes across all grades. However, when broken down by grade we find statistically significant positive effects in preschool through grade 2, positive but nonsignificant effects in grades 3 and 4, and negative but nonsignificant effects in grades 5 and 6. It may be that attitudes are more difficult to change in older children. In general, while some of the attitude gains are statistically significant they are not large in magnitude. Though the interaction renders the overall gain small in magnitude (1.9 percent gain or about .1 standard deviations) the gains in preschool through grade 2 are somewhat larger, about four percent or one item (.25 standard deviations).

Finally, the evaluation found positive treatment effects on plate waste. Across all food groups plate waste was reduced by 25 percent in the treatment group compared with a one percent reduction in the comparison group. Significant treatment effects were found for all food types except milk. Although there is no questioning the statistical significance of the effect, the use of percentage change as a metric makes the differences look quite large. Use of a different metric, e.g., change in grams, would tell the same story in terms of statistical significance, but leads to a conclusion that sounds very different--the total reduction in plate waste was 36.5 grams, or about 1.25 ounces per child. In the absence of information on the total amount served it is difficult to make judgments about the practical significance of either a 25 percent or a 1.25 ounce reduction in plate waste. What is clear, is that the metric influences our interpretation of the effect size.

Evaluation of the California NET Program (Meckler and Wilcox 1980)

Meckler and Wilcox (1980) conducted a major evaluation of the California NET program in 1979-80. The study involved over 13,000 children in 143 schools that conducted a range of NET programs throughout California. Non-randomly formed treatment and comparison groups were administered a pretest and posttest battery designed to measure knowledge, attitudes, and plate waste. The evaluators analyzed the data grade by grade and found positive effects across grades pre-K through 6 on student knowledge, overall positive effects on plate waste (although there was a mix of positive, null, and negative effects that vary by food type and grade), and no effects on attitudes.

The generally positive picture for knowledge must be tempered in two areas. First, though statistically significant effects favoring the treatment group were found in every grade from preschool to grade 6, the report gives no assessment of the magnitude of the effects. The knowledge test included 15 items for preschool and grade K, and 22 items for grades 1-6. Adjusted treatment/comparison group posttest differences ranged from .3 items in grade 2 to 3.7 items in grade 3 with an overall mean of 1.6 items. Clearly, the difference of .3 items is small and the difference of 3.7 items is large, but in the absence of information on the variability of test scores it is difficult to draw conclusions as to the practical significance of the knowledge effects.

Evaluation of "Nutrition in a Changing World", Conducted in Pennsylvania by Shannon et al. (1981)

Shannon et al. (1981) conducted a study of the impact of "Nutrition in a Changing World," a comprehensive integrated nutrition education curriculum for grades K-6. This curriculum is one of several recommended for use by Pennsylvania NET officials and is being implemented in many local NET projects in that state.

The evaluation compared three levels of treatment--use of the curriculum guide plus a 45-hour nutrition education course for the classroom teacher, use of the curriculum guide plus a three-hour in-service training course for the teacher, and use of the curriculum guide with no extra training for the teacher--and no nutrition education (a control group). Twenty-nine schools were randomly assigned to one of the treatment groups. The final sample included 156 classrooms and 2,959 children in grades K, 1, 4, 5, and 6. All children were pretested with a battery of curriculum-specific knowledge measures and posttested ten weeks later.

Collapsing across the three different levels of treatment the evaluators found positive effects of instruction (i.e., presentation of the nutrition curriculum regardless of type of teacher training) on nutrition knowledge at all grade levels. The magnitude of the effects ranged from about one item in grades 1 and 5 to three items in grades 4 and 6. Statistically significant effects of different types of teacher preparation were found but they varied by grade and type of preparation. Kindergarten children taught by teachers having the three-hour in-service training did better than the other two groups (by less than one item); in grade 4 children of teachers who had the 45-hour course did better than the other two groups (by about three items); and in grade 6 the three-hour in-service group outscored the 45-hour training group (by about two and one-half items). No effects of different forms of teacher preparation were found in grades 1 and 5.

To sum up, the evaluation found positive effects of the nutrition education curriculum on nutrition knowledge, the only outcome investigated. However, an interesting study of the effects of different types of teacher preparation found that "the provision of an in-service or formal course as additional teacher preparation did not promote consistent improvement in student outcome, particularly with the younger grades."

West Virginia Nutrition Education Evaluation
(West Virginia Department of Education 1977)

This project included the development, implementation, and evaluation of a nutrition education curriculum guide for grades K-6 in West Virginia. Though the evaluation was conducted prior to the initiation of NET in 1977, it was funded by FNS. Over 200 schools were randomly assigned to treatment and control status, but many elected not to participate and the study was conducted using 44 experimental and 42 control schools. The study design is notable in that it controlled for the possible effects of learning from the pretest.

The treatment schools sent teachers to a two-day in-service program and implemented the nutrition education curriculum in grades K-6 over a three-month time period. Over 23,000 treatment and control children were pre and posttested with a battery of measures including knowledge tests and attitude inventories. Plate waste and school lunch participation were also measured.

The evaluators found positive program effects on nutrition-related knowledge in grades K-3, 5, and 6. Though control group children showed pre/post gains in all grades they were outperformed by the treatment children in all except the fourth grade. While this finding corroborates those of most other nutrition education evaluations, the present study also found positive treatment effects on food-related attitudes in all grades except kindergarten. Again, control group attitudes improved in most grades, but treatment group attitudes improved significantly more.

A plate waste study also found positive effects in which treatment children exhibited a reduction in plaste waste from pre to posttest that was significantly greater than the reduction for control children on five out of seven measured foods. Plate waste was reduced for broccoli from 63 to 56

percent, for tacos from 41 to 24 percent, for milk from 17 to 13 percent, for cauliflower from 55 to 36 percent, and for spanish rice from 44 to 36 percent. Plate waste was reduced for the other two foods, but not significantly. As was the case in the Wolff (1980) evaluation of the California NET curriculum guide, it is difficult to make informed judgments about the practical significance of these plate waste findings without information on the total amount served. Finally, the evaluation found no evidence of an impact on school lunch participation; not surprising in light of the short pre/post test period.

This evaluation presents some of the most impressive results reviewed in this study. Strong positive effects were reported on nutrition-related knowledge, food attitudes, and plate waste. While the evaluation design is characterized by self-selection of schools, the results do conform to the program developers' hypotheses.

Evaluation of "Food is My Bag"
(Applied Management Sciences 1976)

This project involved the development, implementation, and evaluation of a nutrition education program in five states by Applied Management Sciences (AMS). Though this study was conducted prior to initiation of the NET program, it was funded by FNS.

From the five states selected by FNS, AMS chose one school district in each based on geographic location and socioeconomic status. Six schools were then selected within each district, two from each of three grade ranges (elementary, junior high, senior high), and two classes were selected from each grade level in each school. AMS developed a nutrition education program package for the selected school districts and worked with the local school personnel in implementing the program. The curriculum package contained 15 units

of instruction--three curriculum units (Basic Nutrition, Consumer Education, and Health Education) for each of five selected grade ranges (K-1, 2-3, 4-6, 7-9, 10-12). A companion booklet of related activities was also developed for use by the school food service manager.

During the field test period of approximately three months, knowledge tests and attitudinal questionnaires were administered to control and experimental subjects as a pretest, posttest, and 30-day follow-up posttest. Plate waste observations were also conducted by project staff at each control and experimental site during the three test periods. Based on the evaluation the AMS researchers drew the following conclusions:

- Significant statistical gains in nutrition knowledge took place among experimental students for the Basic, Health, and Consumer Units at all grade levels. No similar gains were noted for the control students.

- There was no overall significant positive or negative effect on students' practices and attitudes toward food at school and away from school. There were positive changes in certain individual attitudinal scale items and at certain grade levels. The greatest amount of positive change was noted for grade spans K-1 and 2-3.

- Plate waste observations demonstrated modest improvement in consumption of the school lunch by experimental students with significantly increased consumption of meat, milk, bread, and "other" foods (e.g., dessert, potato chips, etc.) for most grade levels.

CONCLUSIONS ABOUT THE IMPACTS OF NUTRITION EDUCATION

Each of the evaluations discussed here has its weaknesses; however, as a group the studies yield some fairly convincing evidence on the effects of nutrition education. Table 5 summarizes results from the evaluations discussed in this chapter by noting the major findings on each of several outcomes. First, it appears relatively easy to produce positive effects on nutrition knowledge. All eight studies report positive findings

Table 5

Summary of Findings from FNS and NET-Funded Evaluations

EVALUATION	OUTCOMES				
	KNOWLEDGE	ATTITUDES	REPORTED HABITS	REPORTED PREFERENCE	PLATE WASTE
California (Wolff 1980)	Positive effects in grades 1-6. No effects in preschool and kindergarten. Magnitude of positive effects ranges from .25 - .50 standard deviations.	Positive effects in preschool through grade 2. No effects in grades 3-6. Magnitude of effects is small, from .10 - .25 standard deviations.	N.A.	N.A.	Positive effects on overall consumption. Effects for all food types except milk. Treatment group reduced plate waste by 25 percent (about 1.25 ounces) compared with one percent in the comparison group.
California (Meckler & Wilcox 1980)	Po[illegible] affects in grades 1-[illegible] nitude of effect ranges from .3 to 3.7 items.	No effects.	N.A.	N.A.	Positive effects on meat, vegetables, fruit. Reduction in plate waste varied by food group and grade. When significant, reductions ranged from 8-16 percent over comparison group reduction.
Nebraska (St.Pierre, Glotzer, Cook, & Straw 1981)	Positive effects on several measures in grades 1-6. Magnitude of effects ranges from .25-.90 standard deviations.	No effects.	No effects.	Positive effects on reported food preference and willingness to select new foods in grades 1-3. Mixed effects on reported food preference in grades 4-6.	No effects on total consumption. Positive effects in grades 4-6 in terms of willingness to taste previously rejected foods.
8-State Study (Majure 1980)	Positive effects in grades 1-3 on two of four measures, in grades 4-6 on four of six measures.	No effects.	No effects.	No effects.	N.A.
Georgia (St.Pierre & Glotzer 1981)	Positive effects on several measures in grades 1-4, declining in later grades. Magnitude of effects ranges from .25-1.27 standard deviations.	Mixed effects across several measures and grades 1-6. Positive effects in grades 1-2, perhaps in grades 4-5.	Mixed effects across several measures and grades 1-6. Some positive effects in grades 1-2.	N.A.	N.A.
Pennsylvania (Shannon et al. 1981)	Positive effects in grades K-6. Magnitude of effects ranges from 1 to 3 items. No consistent effect of different forms of teacher preparation.	N.A.	N.A.	N.A.	N.A.
West Virginia (West Virginia State Dept. of Education 1977)	Positive effects in grades K-3, 5-6.	Positive effects in grades 1-6, not in kindergarten.	N.A.	N.A.	Significant reduction for five of seven foods studied. Waste reduced from 4-19 percent for individual foods.
"Food is My Bag" (Applied Management Sciences 1976)	Positive effects in grades K-12.	No overall effects. Some positive change noted in K-3.	No effects.	N.A.	Positive effects on meat, milk, bread at most grade levels. No overall effect.

* No comparison group in this study. Results should be regarded with caution because other studies cited above have found that comparison groups generally exhibit pre/post knowledge gains.

on knowledge, findings that are not only statistically significant, but are of large size (.25-1.27 standard deviations) for social science evaluations. The fact that in most of the studies comparison students also showed pretest/post-test gains suggests that normal maturation, a competing treatment, or some other factor is responsible for gains in nutrition knowledge even in the absence of NET programs. It may be that children have not had a great amount of exposure to nutrition concepts, and that learning these concepts is fun and relatively easy.

Effects on food attitudes and reported food habits are much more difficult to produce. Four studies reported some positive effects on attitudes; however, with the exception of the West Virginia study these varied by measure and grade. The California and Georgia studies did find positive attitude effects in grades 1 and 2 suggesting that it may be easier to alter attitudes for children in the early grades. Four of the studies included an examination of reported food habits, but none found any strong evidence of program effectiveness in this area.

Evidence on food preference was supplied in only two studies. Conclusions are mixed because one study (St.Pierre et al. 1981) found a strong indication of positive effects on reported food preference and willingness to select new foods while the other (Majure 1980) found no effects.

The summary picture is therefore one in which positive effects on knowledge appear to be almost universal while effects on attitudes, food preference, plate waste, and other behavioral measures are scattered and confined to specific grade and food item combinations. These findings make a good deal of sense considering the short-term nature of the programs. Knowledge is easily conveyed in the short-term; to expect a three-week program to significantly impact behaviors that have been formed for several years is quite different.

CHAPTER 5

CONCLUSIONS

This evaluation was conducted when most NET projects were just beginning to be implemented, and NET has made a good start. Programs are operating in most states and NET funds are being distributed and used as intended. Some 86 percent of all NET funding in 1978 and 1979 was spent on grants for almost 3,000 local projects operating in nearly 17,000 schools and reaching more than 3.4 million children. Over 120,000 teachers and 75,000 food service personnel participated in NET-sponsored workshops.

A set of diverse state-level NET programs have been developed and implemented. Some are centralized and administered at the state level, involving all participating projects via a single curriculum. Others are decentralized and, subject to broad guidelines, transfer the responsibility of program development to the local level. Still others are regionally-based, with services being provided by multiple resource centers. Classroom instruction is included in 85 percent of all projects, and 60 percent use the cafeteria as a learning laboratory.

The great majority of NET State Coordinators and project directors report that they are striving toward the goals intended by the enabling legislation including, for example, increasing children's acceptance of nutritious foods; improving teachers' knowledge of the principles and practices of nutrition education; developing and disseminating curricula and other nutrition education materials; increasing children's knowledge of the relationships among food, nutrition, and health; and increasing the use of the school cafeteria as a learning laboratory for nutrition education.

A well-designed evaluation of Nebraska's state-level program showed that a curriculum-oriented, centrally-administered nutrition education program can have positive effects on children's nutrition-related knowledge

across grades 1-6, and positive effects in selected grades on food preference and willingness to select and taste new foods. Evaluations of other nutrition education programs funded by NET and other FNS sources (e.g., California, Georgia, Pennsylvania, West Virginia) demonstrate that decentralized programs can also have positive effects in terms of increased nutrition knowledge. Positive effects on food-related attitudes, habits, preferences, and plate waste were found in certain evaluations, but they vary by grade.

Of course, room for improvement exists. Although most of the objectives of the NET legislation are addressed by the operating programs, there were three areas where, in 1979, NET activities did not appear to be as fully implemented or as successful as desirable* including the training of school food service personnel, the development of integrated programs, and the development of program monitoring and evaluation materials. These topics should be emphasized in the future, perhaps through altered program regulations making expectations in these areas clearer, through the dissemination of information on programs that have been successful in these areas, and through the provision of technical assistance in evaluation.

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*NET projects were in their formative states when this evaluation was conducted. Project development undertaken since 1979 may well have addressed these problems.

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